



A Comparative Study on Computer Systems Servicing Competencies of Students in Senior High School

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Abstract. The development of competent graduates in Computer Systems Servicing (CSS) is vital for preparing Senior High School students for employment and industry certification. This study assessed the demographic profile, self-assessed competency levels, and work immersion performance of CSS students at Baliwasan Senior High School Stand-Alone during the School Year 2024–2025. Specifically, it evaluated whether competency levels differed according to age, sex, and socio-economic status and examined the difference between students' self-assessed competency levels (school-based readiness) and their workplace performance as rated by industry supervisors. Utilizing a descriptive-quantitative research design with simple random sampling, data were collected from n=106 Grade 12 CSS student respondents and their immediate work immersion supervisors using a modified TESDA NC II Self-Assessment Guide. Non-parametric procedures—including the Mann-Whitney U test, Kruskal-Wallis test, and Wilcoxon signed-rank test—were executed due to significant non-normality in the data distribution ($W=0.597$, $p<.001$). Results showed that respondents were predominantly male (88.7%), aged 18–24 years old (74.5%), and belonged to low-income households earning below ₱21,190 monthly (84.9%). Students demonstrated high overall self-assessed competency ($M=4.05$), rating themselves highest in installing and configuring computer systems ($M=4.16$). Industry supervisors likewise evaluated student performance as high overall ($M=3.72$), with peak ratings in installation and configuration ($M=3.85$) and lower scores in maintenance and repair ($M=3.63$). Non-parametric group comparisons indicated no significant differences in self-assessed competency across sex ($p=.798$) or age groups ($p=.721$); however, significant differences were identified across socio-economic brackets ($p<.001$). Furthermore, a Wilcoxon signed-rank test revealed a statistically significant difference between students' self-assessed readiness ($M=4.05$) and supervisors' actual evaluations ($M=3.72$; $Z=-2.694$, $p=.007$), demonstrating a perception gap where students systematically overrate their technical capabilities relative to workplace expectations. Strengthening authentic hands-on troubleshooting, expanding simulated server administration environments, and enhancing school-industry feedback mechanisms are recommended to align student self-perceptions with industry standards.

Keywords: Assessment; Competency-Based; Instruction; Students' Performance; Work Immersion

Introduction

Competency is the acquired knowledge, skills and attitude in accordance to the standard performance in the workplace. It is the possession and application of knowledge, skills and attitudes to the standard of performance required in the workplace. (TESDA, 2020).

The Department of Education has implemented the K to 12 basic education reform programs, which includes Senior High School, primarily aimed at preparing graduates for employment, entrepreneurship, and further education. The Senior High School curriculum may be tailored at the local level to take into consideration the needs of local industries and the labor market. To fulfill this goal, the Baliwasan Senior High School entered into a Work Immersion partnership with the local stakeholders in Zamboanga City. The collaboration impacts the youth by translating academic theories into functional, community-driven outcomes. (Pequit, et.al, 2024).

In Senior High School, one of the courses available is Information and Communication Technology (ICT). Given the dynamic nature of Information Technology, the curriculum needs to adapt to meet the



evolving demands of the industry. One crucial aspect is ensuring students pass the National Assessment in Computer System Servicing (CSS). Obtaining a National Certificate II (NCII) has several advantages as it enhances employability, productivity, and adaptability to the changing requirements of both domestic and international workplaces. (Ona, 2019).

In accordance with the Technical Education and Skills Development Authority (TESDA) Training Regulations, the Computer Systems Servicing National Certificate Level II qualification requires individuals to possess competencies in configuring computer systems, setting up computer networks and servers, as well as maintaining and repairing computer systems and networks. Core competencies represent the central skills required for computer system servicing, involving the installation and configuration of computer systems, setting up computer networks, establishing computer servers, and maintaining and repairing computer systems and networks. (TESDA, 2020).

Despite the efforts of the teacher/trainers, still students experience challenges when it comes to performances. Challenges in computer system servicing NC II trade area inflicted the student's challenges brought by the computer system servicing NC II and these are the competency-based challenges in which it will greatly affect them during their performance.

The study intends to determine the level of Computer Systems Servicing competencies among Senior High School students in Baliwasan Senior High School. Also, the significant difference of the level of competencies and student performance whether school-based or industry-based.

Research Questions

This study aims to determine the competencies in Computer Systems Servicing among Information and Communications Technology students in Baliwasan Senior High School Stand-Alone.

Specifically, it will seek answer to the following questions:

1. What is the profile of students in terms of:
 - 1.1 Age
 - 1.2 Sex
 - 1.3 Socio-Economic Status
2. What is the level of competencies among Senior High School in terms of;
 - 2.1 Install and configure computer systems
 - 2.2 Setup computer networks
 - 2.3 Setup computer servers
 - 2.4 Maintain and repair computer systems and networks
3. What is the level of student performance as rated by the industry supervisor during the senior high school students' work immersion?
4. Is there a significant difference in the level of competencies among senior high school students when grouped according to profile?
5. Is there a significant difference between the students' self-assessed competency level (school-based readiness) and their performance evaluation as rated by industry supervisors?

Scope and Delimitation of the Study

This study focused on the competencies of ICT Senior High School students in Computer System Servicing on their skills performances. The respondents of the research study were the select grade 12 students taking up Computer Systems Servicing Specialization in SY 2024-2025 in Baliwasan Senior High School and Supervisors of the partner agencies.

Literature Review

Competency-Based Learning and Assessment

Competency-based learning emphasizes the acquisition and demonstration of measurable knowledge, skills, abilities, and behaviors that learners need for academic and occupational success. In the Philippine technical-educational context, this approach is supported by Republic Act No. 7796, or the Technical Education and Skills Development Act of 1994, which mandates the development of competency standards for skilled workers. These standards are organized into competency units that establish benchmarks for appropriate work performance and are grouped into qualifications aligned with industry sectors and occupational roles. Similarly, Republic Act No. 10533, or the Enhanced Basic Act of 2013, strengthened the K to 12 curriculum by developing learners' competencies for employment, entrepreneurship, and higher education. The literature indicates that competency is not limited to the acquisition of technical knowledge but involves the ability to apply knowledge and skills in appropriate contexts. Dhungana (2024) described competency as an interaction



among information, skills, and the learning environment, while Arlington (2024) emphasized that competency develops continuously through the acquisition and demonstration of measurable knowledge, skills, abilities, and behaviors. Holubnycha et al. (2022) similarly characterized competency-based education as a learner-centered approach that integrates knowledge, skills, and competencies necessary for academic and professional development. Taken together, these perspectives suggest that competency should be evaluated not merely through what learners know but also through how effectively they apply what they know in authentic situations. Assessment is therefore an essential component of competency-based education. Chao (2018, 2019, 2021), as cited by Liao et al. (2023), emphasized the importance of examining the learning process across cognitive, psychomotor, and affective domains and using multiple forms of assessment to determine learning effectiveness. Vargas et al. (2024) likewise explained that competency-based assessment relies on measurable indicators and evidence-based criteria to determine whether learners have attained the required competencies. In the Philippine setting, DepEd Order No. 8, s. 2015 provides for the assessment of learner performance and recognizes the role of both the Work Immersion Teacher and the Work Immersion Partner Institution Supervisor in evaluating students during work immersion. An important issue emerging from the literature is the difference between learners' perceptions of their own competency and external evaluations of their actual performance. Tabaosares et al. (2024), for example, found that Grade 12 students generally rated their work immersion performance as outstanding, while supervisors provided significantly different assessments. This suggests that self-assessment may not always provide a complete picture of actual competency. Thus, combining learner self-assessment with external or supervisor assessment can provide a more comprehensive understanding of students' competency levels.

Competency-Oriented Instruction and Skills Development

Competency development is also strongly influenced by the instructional strategies used in teaching technical-vocational subjects. Liao et al. (2023) found that competence-oriented instructional strategies produced better overall learning effectiveness than traditional didactic approaches. Although the difference in the knowledge component was not statistically significant, learners exposed to competence-oriented instruction obtained better average outcomes and demonstrated greater opportunities to apply knowledge and skills to practical situations. The findings reinforce the view that technical-vocational education should provide learners with opportunities to connect classroom learning with real-world tasks and industry requirements. Local research provides similar evidence regarding the importance of practical and competency-focused instruction. Cardano et al. (2023), in developing instructional materials for Computer Systems Servicing, used the TESDA Self-Assessment Guide to identify competency areas requiring instructional attention. The study identified setting up computer servers as one of the least mastered competencies and subsequently developed instructional materials to address learners' difficulties. This illustrates how competency assessment can be used not only to measure learning but also to identify specific areas that require instructional intervention. Overall, the literature suggests that competency-oriented instruction is more effective when it combines authentic practice, appropriate instructional resources, and competency-based assessment. Nevertheless, the effectiveness of such approaches ultimately needs to be examined in relation to learners' actual performance, particularly in technical-vocational specializations where practical competence is essential.

Students' Performance and Factors Associated with Competency

Students' performance in technical-vocational education is influenced by multiple academic, psychological, social, and contextual factors. Dacuycuy et al. (2021) emphasized that rapid technological change continues to reshape employment opportunities and occupational requirements, increasing the importance of developing appropriate technical skills among learners. From this perspective, TVET programs serve an important role in preparing learners for occupations where technical and practical competencies are required. Beyond technical preparation, learner characteristics and circumstances may also influence performance. Davidovitch and Dorot (2023) reported an association between socioeconomic status and motivation to succeed, with learners from higher socioeconomic backgrounds demonstrating higher motivation than those from moderate- and low-socioeconomic groups. Similarly, Sirin (2005) found a moderate to strong relationship between socioeconomic status and academic achievement, although the strength of this relationship varied according to contextual factors. Lim (2024) also noted that family background, including the proportion of learners from single-parent households, may be associated with academic performance. However, other evidence suggests that socioeconomic circumstances do not necessarily determine educational outcomes. Valentin et al. (2023) found that academic resilience and self-efficacy had strong effects on academic success regardless of socioeconomic status. This finding is particularly relevant to competency-based education because it indicates that learners' beliefs in their ability to succeed and their capacity to persist through difficulties may contribute substantially to performance. The literature on gender and participation further demonstrates that learner characteristics can interact with educational



experiences. Gomez et al. (2022) reported differences in competencies according to gender and field of study, while Dumadag et al. (2023) found that gender roles, stereotypes, and social norms continue to influence learners' participation and choices in TVET programs. These findings suggest that demographic characteristics may be relevant when examining student performance, although they should not be treated as sole determinants of competency. Taken together, the literature indicates that student performance is multidimensional. Technical instruction, socioeconomic circumstances, family background, self-efficacy, resilience, and demographic characteristics may all contribute to differences in learner outcomes. This supports the need for studies that examine competency performance while also considering relevant learner characteristics.

Work Immersion and Industry-Based Learning

Work immersion provides an important mechanism for connecting competency-based instruction with authentic workplace experiences. DepEd Order No. 30, s. 2017 establishes the guidelines for the implementation of work immersion in Senior High Schools, with the aim of providing learners with opportunities to gain practical experience and develop skills relevant to the workplace. The policy recognizes work immersion as an important component of Senior High School education because it allows learners to experience workplace practices and apply competencies developed in school. The importance of industry engagement is also supported by international literature. Omar et al. (2024) explained that collaboration between industry and TVET institutions can improve the quality and relevance of training by ensuring that learners develop the practical skills and knowledge demanded by employers. Strong school-industry partnerships can therefore contribute to graduate employability and help address mismatches between educational preparation and workplace requirements. Local evidence similarly demonstrates the value of work immersion while identifying areas where competency gaps may remain. Roble (2021) examined the competency level, employers' expectations, and work immersion performance of Senior High School TVL learners. The findings showed no significant difference between students' competency levels and employers' expectations in several areas, including collaboration, critical thinking, entrepreneurship, environmental literacy, information technology, learning and innovation, and lifelong learning. However, differences were identified in communication and occupational health. The study further reported that work immersion performance did not significantly differ according to sex and socioeconomic classification but differed according to strand and specialization. These findings, together with the results of Tabaoares et al. (2024), indicate that work immersion provides an important context to validating students' perceived competencies against external assessments. While learners may perceive themselves as highly competent, supervisor evaluations may reveal areas that require further development. Therefore, work immersion should not be viewed merely as an exposure activity but also as an opportunity to assess whether school-based competencies translate into actual work performance.

Competency, Work Immersion, and Employability

The ultimate value of competency-based technical-vocational education lies in its capacity to prepare learners for employment and further career development. Duhaylungsod (2021) found that competencies developed through the ICT strand of the Senior High School TVL curriculum generally met the ICT skills required by industries in Zamboanga City. The study emphasized the importance of Computer Systems Servicing NCII competencies and TESDA certification in preparing graduates for entry-level employment in the IT sector. Similarly, Alejandro et al. (2024) assessed the readiness of TVL learners in Housekeeping and found that students demonstrated adequate preparation in personal, social, communication, and technical skills. However, employer assessments also identified areas requiring further development. This finding reinforces the importance of incorporating employer or industry perspectives when determining students' readiness for employment. The relation between school-based competency development and employability is also reflected in the broader literature. Omar et al. (2024) emphasized that effective collaboration between educational institutions and industry can improve the relevance of TVET programs and enhance graduates' employability. Thus, technical competency should be understood not only in terms of classroom achievement but also in terms of the learners' ability to perform tasks according to workplace expectations. The literature therefore points to a common concern: although TVL programs are designed to develop employment-oriented competencies, the extent to which learners can demonstrate these competencies in authentic workplace contexts may vary. This makes external assessment, particularly from work immersion supervisors or industry partners, an important source of evidence in evaluating learner competency.

Demographic Characteristics and Learner Outcomes

Studies examining demographic characteristics provide additional context for understanding differences in learner outcomes. Sahoo et al. (2021) reported that education and literacy were positively



associated with motivation to learn, while Tebrits et al. (2021) found that socioeconomic status had a stronger relationship with outcomes in traditional school settings than in immersion programs. This findings suggest that learning environments may influence the extent to which socioeconomic differences affect learner outcomes. Gender and occupational expectations are likewise relevant in technical-vocational education. Paloma et al. (2020) found that vocational education provided both men and women with improved employment prospects, although the career benefits experienced by women and men differed. Gomez et al. (2020) identified differences in specific competency areas according to gender and field of study, while Dumadag et al. (2023) emphasized the continuing influence of gender stereotypes and social norms on learners' participation and specialization choices. At the same time, demographic factors do not consistently produce differences in performance. The findings of Roble (2021), for example, indicated no significant differences in work immersion performance according to sex and socioeconomic classification. Valentin et al. (2023) likewise demonstrated that academic resilience and self-efficacy may have stronger relationships with academic success than socioeconomic status. These mixed findings suggest that demographic characteristics may be relevant variables to examine, but their influence on competency and work immersion performance cannot be assumed. Examining whether competency levels differ according to demographic characteristics can therefore provide empirical evidence regarding which learner factors are actually associated with performance in a specific educational context.

Methodology

Research Design

This study utilized a Descriptive-Quantitative research design, specifically a quantitative research design. Creswell (2018) described quantitative research as a method of testing theories that uses numbers, closed-ended questions, and observations. The descriptive research design, on the other hand, is a study that explains the features of the population or phenomenon being studied. Primarily used to gain understanding of a group of phenomena. This involves collecting data through surveys, interviews, or observations. This design was chosen because it involved gathering and analyzing numerical data to understand and explain phenomena. It required the systematic and objective measurement and quantification of variables, relationships, and patterns using statistical and mathematical methods. Therefore, the Descriptive-Quantitative Research Design was deemed suitable for this study. Additionally, this study employed a correlation approach within the quantitative research framework. It aimed to establish a connection between the level of competencies and student performance in both school-based and industry-based settings.

Sampling Design

The target population for this study consisted of all Grade 12 Senior High School Information and Communications Technology students specializing in Computer Systems Servicing (N=145) undergoing mandatory work immersion as part of their curriculum to prepare for higher education and future careers. Utilizing Slovin's formula with a margin of error of $e=.05$, the minimum required sample size was calculated at $n=113$ respondents. Participants were selected using a simple random sampling technique, which ensures that every individual in the population has an equal and unbiased probability of selection (Noor et al., 2022). A total of 113 survey instruments were distributed to the randomly selected students. Following retrieval and data verification, 106 questionnaires were fully completed and retained for final statistical analysis, yielding an effective sample size of $n=106$ students alongside their 106 corresponding immediate industry supervisors, representing a response rate of 93.8%.

Research Locale

The study was conducted at the Technical Vocational and Livelihood Track, Information and Communications Technology strand of Baliwasan Senior High School Stand-Alone, which is located at San Jose Road, Zamboanga City. The respondents for this study were the Grade 12 Senior High School ICT students at the school and the partner agency's immediate supervisor for the Academic Year of 2024-2025.

Research Participants

For this study, the target population consisted of Grade 12 Information and Communications Technology (ICT) students specializing in Computer Systems Servicing (N=145). A final sample of 106 student respondents (and their respective immediate work immersion supervisors) participated in the study following the sample size determination via Slovin's formula.

Research Instrument

The research questions are extracted from the Self-Assessment Guide of TESDA for Computer Systems Servicing NCII with minor revisions to suit the context of this study. The questionnaire consists of the level of competencies and students' performance. The questionnaire also included the students' age, sex, and socioeconomic status. The same questionnaire was used for both the students to assess their school-based performance and the work immersion supervisors to evaluate the students' industry-based performance. The school-based performance refers to the responses obtained from the selected student respondents. In contrast, the industry-based performance refers to the performance ratings of the 106 students provided by the industry stakeholders who supervised them during their work immersion.

Data Gathering Procedure

The researcher requested permission to gather data by submitting a letter of intent to the School Division Superintendent of Zamboanga City. After approval was granted, the researcher presented the superintendent's letter of permission to the school principals of the selected research locations. The researcher coordinated with the advisers and other grade twelve (12) teachers to send the survey form in google form to their respective students for the school year 2024-2025. On the other hand, questionnaire forms as well as the letter of intent were given to the partner agencies where the students undergone their Work Immersion. Afterwards, the data was gathered, checked, compiled, organized, and analyzed using the Statistical Package for Social Sciences (SPSS). The questionnaire consists of forty items, each of which presented as a statement. All of these statements are soliciting for a rate using the Likert Scale.

Results and Discussions

Research Question 1: What is the profile of students in terms of Age, Sex and Socio-Economic Status?

Table 1. Demographic Profile of student-respondents in terms of age

Age Range	Frequency	Percentage
17 and below	24	22.6
18 – 24	79	74.5
25 and above	3	2.8
Total	106	100

Table 1 shows the age distribution of the senior high school respondents, with most students falling within the 18 to 24 age group, comprising 79 out of 106 respondents or 74.5%. This is slightly older than the typical senior high school age range of 16 to 18, indicating possible delays or interruptions in schooling. The second largest group is students aged 17 and below, with 24 respondents or 22.6%, which aligns more closely with the expected age for senior high school learners. A small portion of the respondents, 3 students or 2.8%, are aged 25 and above, suggesting the presence of adult learners who may have returned to complete their secondary education due to employment, financial, or personal circumstances. This varied age distribution highlights that the senior high school population is not uniform. Age differences may influence learning styles, motivation, and academic engagement, as older students often have different life experiences and responsibilities compared to younger learners. These factors may also reflect socio-economic challenges that affect educational continuity. Philippine Institute for Development Studies [PIDS] (2025) supports these findings which states that that age variation among learners is common in the Philippine education system and underscore the need for flexible instructional approaches that accommodate diverse learner backgrounds.

Table 2. Demographic Profile of students-respondents in terms of sex

Sex	Frequency	Percentage
Male	94	88.7
Female	12	11.3
Total	106	100

Table 2 shows a significant imbalance in the sex distribution of the senior high school respondents. Out of 106 participants, 94 (88.7%) are male, while only 12 (11.3%) are female, indicating a highly male-dominated sample population. This distribution suggests that the study area is predominantly composed of male students, which may be influenced by the nature of the academic strands offered, particularly Technical-Vocational-Livelihood (TVL) and ICT-related programs that traditionally attract more male enrollees. Cultural

and social factors may also contribute, such as gendered preferences in career paths or differences in access to technical education opportunities. Because of this imbalance, the findings of the study are more likely to reflect male perspectives and experiences. This limits the generalizability of the results across genders. Therefore, future studies should consider achieving a more balanced gender representation or conducting focused analyses on gender differences. Overall, the data highlights the importance of gender representation in educational research. The findings of the study were supported by Requino et.al (2023), who investigated gender roles and stereotypes within Philippine TVET programs. It discovered that, in the culture, technical skills tend to be linked with men and caregiving roles with women, and these shape students' decisions regarding TVL specializations and reinforce gender inequalities. It highlights the need for an integrated approach towards gender equality in TVET, such as changing societal attitudes about gender roles, norms, and stereotypes. The authors propose that changing the way children think about gender is a good place to start, since gender schema contributes greatly to the identified gender issues.

Table 3. Cross tabulation of students-respondents' age and sex

Age of Students	Male	Female	Total
17 and below	21	3	24
18 – 24	70	9	79
25 and above	3	0	3
Total	94	12	106

The cross-tabulated data in Table 3 reveals a pronounced gender imbalance among the respondents, with 94 out of 106 students (88.7%) being male and only 12 (11.3%) females. This pattern is consistent across all age groups, indicating that male dominance is not confined to a specific cohort but is a general characteristic of the sample. In the 17 and below category, 21 are males and 3 are females, showing early-stage senior high school enrollment is already male-dominated. The largest group, aged 18–24, comprises 79 students, with 70 males and 9 females, making it the most diverse yet still heavily male. The 25 and above group includes 3 males and no females, suggesting that older learners in this track are exclusively male, possibly due to work-related upskilling or interrupted education pathways. Overall, the age distribution shows that most respondents fall within the 18–24 age range (74.5%), while younger learners (17 and below) account for 22.6%, and older learners (25 and above) represent 2.8%. This confirms that senior high school includes both traditional and non-traditional students. The gender disparity may limit the generalizability of findings, as male perspectives are overrepresented. The dominance of males may also reflect the nature of Technical-Vocational-Livelihood tracks, which tend to attract more male enrollees. These demographic patterns suggest the need for inclusive policies to encourage greater female participation and support diverse learner groups.

Table 4. Demographic profile of students' respondents in terms of socio-economic status

Family's Gross Income	Frequency	Percentage
21,190 and below	90	84.9
21,191 – 43,828	14	13.2
43,829 – 76,669	1	9
76,670 and above	1	9
Total	106	100

Table 4 presents the socio-economic status of the student respondents based on family gross income. The data shows that the majority of students (84.9%) come from families earning less than 21,190, indicating that most respondents belong to low-income households. This suggests that a significant proportion of students may be facing financial challenges that could affect their access to learning resources, academic performance, and overall educational experience. The clustering of respondents in the lower-income bracket highlights the presence of socio-economic constraints within the student population. These findings emphasize the need for targeted support programs such as financial assistance, scholarships, and learning resource subsidies to help reduce barriers to education. Understanding the socio-economic profile of learners is essential in developing inclusive and equitable educational interventions. This is supported by Sirin (2005), who found that socio-economic status has a moderate to strong relationship with academic achievement, depending on various contextual factors.

Research Question 2: What is the level of competencies among Senior High School in terms of Install and configure computer systems, Setup computer networks, setup computer servers and maintain and repair computer systems and networks?

Table 5. Level of Competencies among Student-Respondents in Terms of Installing and Configuring Computer Systems

Statements The student...	Mean	Descriptive Rating	Interpretation
1. identify the materials necessary to complete the work and check against system requirements.	4.37	Strongly Agree	Very High
2. assemble the computer hardware following the OH&S policies, procedures, and system requirements.	4.37	Strongly Agree	Very High
3. perform Basic Input Output System (BIOS) configuration based on system requirements.	4.25	Strongly Agree	Very High
4. create portable bootable devices.	4.15	Agree	High
5. install operating system according to established installation procedure and end-user agreement.	3.95	Agree	High
6. install and configure drivers of peripherals and devices according to manufacturer's instructions and OS installation procedures.	4.14	Agree	High
7. install application software based on installation guides, end-user agreement and license agreement.	4.12	Agree	High
8. check the quality of work by using the installed applications.	4.08	Agree	High
9. access and install OS and driver updates/patches based on manufacturer's recommendations and requirements.	4.14	Agree	High
10. test devices / installations to check if it conforms to requirements.	3.98	Agree	High
Over-All Mean	4.16	Agree	High

Table 5 shows that Senior High School students have a high level of competency in installing and configuring computer systems, with an overall mean score of 4.16, indicating strong self-perceived proficiency. The highest-rated skills include identifying required materials and verifying system requirements (4.37), assembling computer hardware following OH&S procedures (4.37), and performing BIOS setup (4.25), reflecting strong capability in hardware preparation and initial system configuration. These results suggest that current technical training effectively develops students' hands-on skills in computer assembly and setup. However, software-related competencies such as creating bootable devices, installing operating systems and drivers, updating systems, and conducting system testing received comparatively lower yet still high ratings. This indicates that while students are generally confident, they need further exposure to software installation, system validation, and troubleshooting processes. Overall, students meet the expected ICT competency standards, but enhanced hands-on activities, simulations, and problem-solving tasks are recommended to strengthen software-related skills and improve overall technical readiness for industry demands. The findings are opposed by the study of Tabaosares and Castillo (2024). Their findings revealed that students generally rated their performance as outstanding; however, a significant difference existed between self-assessments and supervisor ratings. Students tended to evaluate their performance more favorably than their supervisors did, indicating a discrepancy between personal perceptions and external evaluations.

Table 6. Level of Competencies among Student-Respondents in Terms of Setting Up Computer Networks

Statements The student...	Mean	Descriptive Rating	Interpretation
1. determine and plan cable routes according to network design.	4.21	Strongly Agree	Very High
2. identify the materials necessary to complete the work according to system requirements.	4.15	Agree	High
3. use appropriate personal protective equipment and follow OH & S policies and procedures.	4.08	Agree	High
4. perform copper cable splicing in accordance with 568A and 568B color coding standards.	4.00	Agree	High
5. install network cables and cable raceway following established procedures.	4.01	Agree	High
6. check network connectivity of each terminal as per network design.	4.02	Agree	High
7. configure IP address of all devices.	4.09	Agree	High
8. share files and access resources from other devices.	4.02	Agree	High
9. configure client computer Wi-Fi access.	3.89	Agree	High
10. configure firewall / advanced settings.	3.86	Agree	High
Over-all Mean	4.03	Agree	High

Table 6 shows that students demonstrate a high level of competence in setting up computer networks, with an overall mean score of 4.03, indicating confidence in performing networking tasks and procedures. The highest-rated competency was determining and planning cable routes according to network design ($M = 4.21$), interpreted as "Very High," showing strong ability in interpreting network layouts and applying proper cable management practices. This reflects mastery of essential planning skills relevant to both residential and commercial networking environments. All other indicators were rated "High," showing generally balanced competencies across network configuration tasks. Students performed well in IP configuration (4.09), occupational health and safety compliance (4.08), and cable splicing using 568A and 568B standards (4.00), demonstrating familiarity with both technical and industry practices. However, firewall configuration (3.86) and Wi-Fi access setup (3.89) received slightly lower ratings, suggesting that more complex skills involving network security and wireless systems require further development.

Table 7. Level of Competencies among Student-Respondents in Terms of Setting Up Computer Servers

Statements The student...	Mean	Descriptive Rating	Interpretation
1. identify the necessary hardware and software requirements of a computer server.	4.20	Agree	High
2. install software for computer server.	4.23	Strongly Agree	Very High
3. configure the network settings of the server.	4.07	Agree	High
4. check connectivity of computer server to the client (peer-to-peer connection).	4.04	Agree	High
5. install and update required add-on roles based on NOS installation process.	4.03	Agree	High
6. assign IP address to the clients.	4.00	Agree	High
7. check operation of network services.	3.91	Agree	High
8. perform network testing through file and printer sharing.	4.06	Agree	High
9. perform remote desktop.	3.90	Agree	High
10. complete reports according to enterprise policies and requirements.	4.01	Agree	High
Over-all Mean	4.05	Agree	High

Table 7 shows that Senior High School students demonstrate a high level of competency in setting up computer servers, with an overall mean score of 4.05. This indicates that students have developed a strong foundation in both theoretical and practical aspects of server-related operations. They performed best in determining hardware and software requirements ($M = 4.20$) and configuring network settings ($M = 4.07$),

which are essential for proper server installation and system integration. Students also showed high competency in peer-to-peer connectivity testing ($M = 4.04$), installing add-on roles ($M = 4.03$), and completing documentation and reporting tasks ($M = 4.01$), reflecting both technical and procedural preparedness. However, slightly lower scores were noted in remote desktop usage ($M = 3.90$) and network service verification ($M = 3.91$), suggesting areas for further improvement through more advanced, hands-on training and simulated enterprise environments. Despite these minor gaps, the results confirm that students are well-prepared for ICT-related roles, particularly in systems administration and technical support. The findings align with studies by Almerino et al. (2020), emphasizing the importance of hands-on training and industry-relevant competencies in developing employable ICT graduates.

Table 8. Level of Competencies in Maintaining and Repairing Computer Systems and Networks

Statements The student...	Mean	Descriptive Rating	Interpretation
1. plan and prepare maintenance and/or diagnosis of faults in line with job requirements.	4.16	Agree	High
2. obtain and check materials necessary to complete the work in accordance with established procedures and checks against job requirements.	3.96	Agree	High
3. follow OHS policies and procedures.	3.86	Agree	High
4. check computer systems and networks for maintenance against job/service order instructions and specifications.	4.06	Agree	High
5. perform scheduled/periodic maintenance in accordance with manufacturer's requirements.	3.98	Agree	High
6. diagnose faults or problems in the computer systems and networks according to requirements and in line with the standard procedures.	3.87	Agree	High
7. replace or correct defective components or parts without damage to the surrounding environment or services.	3.85	Agree	High
8. follow 5S and 4Rs according to environmental policies.	3.75	Agree	High
9. ensure that the testing performed on the device complies with the manual or instructions provided by the manufacturer.	3.89	Agree	High
10. check and test computer systems and networks to ensure safe operation.	4.08	Agree	High
Over-all Mean	3.95	Agree	High

Table 8 shows that students demonstrated a high level of competency in maintaining and repairing computer systems and networks, with an overall mean score of 3.95. All competency indicators were rated within the "High" category, indicating that students possess the necessary knowledge and skills to perform technical tasks effectively. The highest-rated competency was planning and preparing maintenance and fault diagnosis activities (4.16), highlighting students' strong ability to organize and prepare for troubleshooting tasks. In contrast, following 5S and 4Rs according to environmental policies received the lowest rating (3.75), suggesting a need for greater emphasis on workplace organization and environmental practices. The results indicate consistent proficiency in safety procedures, diagnostics, materials handling, and operational testing. While students perceive themselves as highly capable in computer maintenance and repair, additional hands-on training, experiential learning, and objective assessments are recommended to strengthen practical troubleshooting skills and better align self-confidence with actual workplace performance.

Table 9. Summary of student-respondents level of competencies in Computer Systems Servicing

Parameter	Mean	Verbal Description	Interpretation
Install and Configure Computer Systems	4.16	Agree	High
Setup Computer Networks	4.03	Agree	High
Setup Computer Servers	4.05	Agree	High
Maintain and Repair Computer Systems and Networks	3.95	Agree	High
Grand Mean	4.05	Agree	High

Table 9 shows that students possess a high level of proficiency in all major areas of Computer Systems Servicing, with a grand mean of 4.05. The highest-rated competency was Install and Configure Computer Systems and Networks (4.16), indicating strong confidence in tasks such as operating system installation, driver setup, and hardware assembly. Setup Computer Servers (4.05) and Setup Computer Networks (4.03) also received high ratings, reflecting students' capability in handling advanced networking and server-related tasks. Although Maintain and Repair Computer Systems and Networks (3.95) received the lowest mean, it remained highly rated, suggesting a need for further development in troubleshooting, repair, and maintenance skills.

Research Question 3: What is the level of student performance as rated by the industry supervisor during the senior high school students' work immersion?

Table 10. Level of performance among Students in Terms of Installing and Configuring Computer Systems as rated by the supervisors of the industry

Statements The student...	Mean	Descriptive Rating	Interpretation
1. identify the materials necessary to complete the work and check against system requirements.	4.08	Agree	High
2. assemble the computer hardware following the OH&S policies, procedures, and system requirements.	3.88	Agree	High
3. perform Basic Input Output System (BIOS) configuration based on system requirements.	3.92	Agree	High
4. create portable bootable devices.	3.74	Agree	High
5. install operating system according to established installation procedure and end-user agreement.	3.85	Agree	High
6. install and configure drivers of peripherals and devices according to manufacturer's instructions and OS installation procedures.	3.86	Agree	High
7. install application software based on installation guides, end-user agreement and license agreement.	3.86	Agree	High
8. check the quality of work by using the installed applications.	3.71	Agree	High
9. access and install OS and driver updates/patches based on manufacturer's recommendations and requirements.	3.73	Agree	High
10. test devices / installations to check if it conforms to requirements.	3.86	Agree	High
Over-All Mean	3.85	Agree	High

Table 10 indicates that students demonstrated a high level of performance in computer assembly, software installation, and system configuration, with a grand mean score of 3.85, interpreted as High. This suggests that students are competent and confident in performing essential installation and configuration tasks. The highest-rated competency was identifying materials and system requirements (4.08), reflecting strong preparation and planning skills before technical work. Other highly rated areas included BIOS setup, safe hardware assembly, driver and application installation, and device testing after installation, indicating proficiency in both theoretical and practical IT skills. Although creating portable bootable devices and evaluating work quality through installed applications received slightly lower ratings, they were still rated High. Overall, the results show that students are well-prepared for critical IT installation and configuration tasks, with only minor areas needing further enhancement.

Table 11. Level of Performance among Students in Terms of Setting Up Computer Networks as rated by the Supervisors of the industry

Statements The student...	Mean	Descriptive Rating	Interpretation
1. determine and plan cable routes according to network design.	3.90	Agree	High
2. identify the materials necessary to complete the work according to system requirements.	3.76	Agree	High
3. use appropriate personal protective equipment and follow OH & S policies and procedures.	3.72	Agree	High
4. perform copper cable splicing in accordance with 568A and 568B color coding standards.	3.65	Agree	High
5. install network cables and cable raceway following established procedures.	3.62	Agree	High
6. check network connectivity of each terminal as per network design.	3.70	Agree	High
7. configure IP address of all devices.	3.70	Agree	High
8. share files and access resources from other devices.	3.69	Agree	High
9. configure client computer Wi-Fi access.	3.67	Agree	High
10. configure firewall / advanced settings.	3.61	Agree	High
Over-all Mean	3.70	Agree	High

Table 11 shows that Senior High School students demonstrated a high level of performance in setting up computer networks, as evaluated by industry supervisors. All indicators received ratings interpreted as "High," with an overall mean score of 3.70, reflecting positive assessments of students' ability to perform network-related tasks in actual workplace settings. Among the competencies, planning cable routes received the highest rating, indicating strong understanding of network design and installation principles. The consistently high ratings across all indicators suggest that students possess both the theoretical knowledge and practical skills necessary for network setup and implementation. However, tasks involving cable installation, splicing, and firewall configuration received slightly lower ratings, highlighting areas where additional training and hands-on experience may be beneficial. Overall, the findings indicate that students are work-ready and capable of applying their networking competencies effectively, while further exposure to advanced cabling and configuration techniques can enhance their industry preparedness.

Table 12. Level of Performance among Students in Terms of Setting Up Computer Servers as rated by the Supervisors of the industry.

Statements The student...	Mean	Descriptive Rating	Interpretation
1. identify the necessary hardware and software requirements of a computer server.	3.94	Agree	High
2. install software for computer server.	3.81	Agree	High
3. configure the network settings of the server.	3.66	Agree	High
4. check connectivity of computer server to the client (peer-to-peer connection).	3.75	Agree	High
5. install and update required add-on roles based on NOS installation process.	3.68	Agree	High
6. assign IP address to the clients.	3.67	Agree	High
7. check operation of network services.	3.73	Agree	High
8. perform network testing through file and printer sharing.	3.74	Agree	High
9. perform remote desktop.	3.58	Agree	High
10. complete reports according to enterprise policies and requirements.	3.56	Agree	High
Over-all Mean	3.71	Agree	High

Table 12 represents supervisors' assessment of students' performance in important tasks involving computer server setup and configuration. All indicators were scored using a mean score that was interpreted as "High", which indicates that students are performing well in actual server-related tasks. Overall Mean: 3.71

– Interpreted as High, which implies that industry supervisors are satisfied with the performance of the students in setting up server systems. Students could be advantageously exposed to administrative tools and formal reporting layouts.

Table 13. Level of Performance among Students in Terms of Maintaining and Repairing Computer Systems and Networks as rated by the Supervisors of the industry

Statements The student...	Mean	Descriptive Rating	Interpretation
1. plan and prepare maintenance and/or diagnosis of faults in line with job requirements.	3.75	Agree	High
2. obtain and check materials necessary to complete the work in accordance with established procedures and checks against job requirements.	3.68	Agree	High
3. follow OHS policies and procedures.	3.69	Agree	High
4. check computer systems and networks for maintenance against job/service order instructions and specifications.	3.68	Agree	High
5. perform scheduled/periodic maintenance in accordance with manufacturer's requirements.	3.58	Agree	High
6. diagnose faults or problems in the computer systems and networks according to requirements and in line with the standard procedures.	3.50	Agree	High
7. replace or correct defective components or parts without damage to the surrounding environment or services.	3.61	Agree	High
8. follow 5S and 4Rs according to environmental policies.	3.56	Agree	High
9. ensure that the testing performed on the device complies with the manual or instructions provided by the manufacturer.	3.61	Agree	High
10. check and test computer systems and networks to ensure safe operation.	3.62	Agree	High
Over-all Mean	3.63	Agree	High

Table 13 presents that Senior High School students demonstrated a high level of performance in maintaining and repairing computer systems and networks, based on evaluations from industry supervisors. Using a five-point Likert scale, all performance indicators received mean scores ranging from 3.50 to 3.75, interpreted as High, suggesting that students are generally capable of performing maintenance and repair tasks according to industry standards. The highest-rated competency (3.75) was the ability to organize and prepare for maintenance and fault diagnosis, reflecting strong planning and preparation skills. Meanwhile, the lowest-rated competency (3.50) was diagnosing faults or problems, indicating an area where additional training and practical experience may be beneficial. The overall mean score of 3.63 confirms that students possess the necessary competencies to meet workplace expectations in computer systems and network maintenance and repair.

Table 14: Summary of students' performance in Computer Systems Servicing as rated by the Supervisors in the industry

Parameter	Mean	Verbal Description	Interpretation
Install and Configure Computer Systems	3.85	Agree	High
Setup Computer Networks	3.70	Agree	High
Setup Computer Servers	3.71	Agree	High
Maintain and Repair Computer Systems and Networks	3.63	Agree	High
Grand Mean	3.72	Agree	High

Table 14 revealed a high overall performance among students in the core competencies of Computer Systems Servicing, with a grand mean of 3.72. Industry supervisors perceived students as competent and well-prepared for tasks related to computer systems servicing. Among the competency areas, Install and Configure Computer System and Network received the highest rating (3.85), indicating strong skills in system setup and configuration. This was followed by Setup Computer Servers (3.71) and Setup Computer Networks (3.70), reflecting good proficiency in networking and server-related tasks. Although Maintain and Repair Computer System and Network obtained the lowest mean score (3.63), it still fell within the high-performance category,

suggesting the need for further improvement in maintenance and troubleshooting skills. Specifically, students may benefit from additional training in assigning IP addresses, network testing through file and printer sharing, installing and updating server roles, and performing remote desktop tasks. These findings support Duhaylungsod (2021), who found that ICT competencies under the TVL track meet industry employability requirements and prepare graduates for entry-level IT positions.

Preliminary Data Analysis (Normality Assessment)

Prior to executing inferential statistical analyses, the distribution of overall competency and performance scores was evaluated for normality using the Shapiro-Wilk test. As presented in Table 15, the test revealed a statistically significant departure from a normal distribution, $W=0.597$, $p<.001$. Because the data are composed of ordinal Likert-scale items and violated the assumption of normality required for parametric testing, non-parametric procedures were utilized for subsequent analyses. Specifically, the Mann-Whitney U test and Kruskal-Wallis test was employed for demographic group comparisons, while the Wilcoxon signed-rank test was applied for paired comparisons.

Table 15: Normality Test (Shapiro-Wilk)

	W	p
Overall Competency Level	0.597	< .001
Note. A low p-value suggests a violation of the assumption of normality		

Research Question 4: Is there a significant difference in the level of competencies among senior high school students when grouped according to profile?

Table 16. Mann-Whitney U test on the students' level of competency when respondents are grouped according to sex

Variable	Sex	N	Mean Rank	Mann-Whitney U	Asymp. Sig. (2-tailed)
Overall Competency Level	Male	94	53.77	539.000	.798
	Female	12	51.42		

Table 16 presents the comparison of students' overall competency levels when grouped according to sex. The analysis yielded an asymptotic significance (p-value) of 0.798, which is greater than the standard 0.05 alpha level. Consequently, the null hypothesis is failed to be rejected (accepted). This indicates that there is no statistically significant difference in the self-assessed competency levels between male and female senior high school students. The findings demonstrate that technical competency levels among male and female respondents in this study are comparable, countering common assumptions regarding gender-based performance predispositions in technical-vocational fields. The high p-value ($p=.798$) confirms that any slight variation in mean ranks between male (Mean rank=53.77) and female (Mean rank=51.42) students is likely due to random chance rather than a systemic gender disparity.

In contrast to the revealed data, Oliquino (2019) with his study conducted at a state technical-vocational institution in the Philippines assessed the 21st-century skills of Computer System Servicing (CSS) students. The findings indicated that female students exhibited a higher level of competency compared to male. Specifically, female students had an overall weighted mean score of 3.257, while male students scored 2.579. Both scores fall under the "Moderately Competent" category, but the data suggests that female students may possess stronger soft skills such as communication and adaptability, which are crucial in technical-vocational education. On the other hand, Peto et.al (2021), on their study on gender differences in the skill content of jobs, found that women report significantly lower levels of numeracy and computer skill usage, and they also read and write significantly less at the workplace than men.

Table 17: Kruskal -Wallis Test on the students' level of competency when respondents are group according to age

Variable	Sex	N	Mean Rank	Kruskal-Wallis H	Asymp. Sig. (2-tailed)
Overall Competency Level	16 - 17 years old	24	56	0.655	0.721
	18 - 24 years old	79	53.26		
	25 years old and up	3	43.13		

Table 17 illustrates the comparison of student competency levels across different age brackets. The statistical analysis yielded an H -value of 0.655 with an asymptotic significance (p -value) of .721. Because the significance value exceeds the standard alpha threshold of .05, the null hypothesis is retained. This indicates that there is no statistically significant difference in overall self-assessed competency levels among students when grouped by age. The mean ranks across the age groups—56.00 for students aged 17 and below, 53.26 for those aged 18 to 24, and 43.13 for learners aged 25 and above—demonstrate relative consistency in perceived technical readiness regardless of age. These findings suggest that baseline technical competence developed within the curriculum is uniform across the student cohort, and age does not serve as a determining factor in student self-assessments.

Empirical evidence indicates that there is an age homogeneity of competencies among high school senior students when classified by age. The finding suggests that age cannot be used to make significant differences in competency levels within this specific student cohort. The findings are supported by a longitudinal study by Eccleston et al. (2021) examined competency development over time in high school students and concluded that age-related factors become less important as students engage more actively in their learning environments. In conclusion, this study brings to light the interaction between competency levels and age among senior high school students and finds that age has no influence on competencies as determined by the Kruskal-Wallis Test.

Table 18. Kruskal -Wallis Test on the students' level of competency when respondents are group according to socio-economic status

Variable	Sex	N	Mean Rank	Kruskal-Wallis H	Asymp. Sig. (2-tailed)
Overall Competency Level	Below P21,190	90	48.92	22.268	<.001
	P21,194 - P43,828	14	86.5		
	P43,829 - P76,669	1	1		
	Above P76,669	1	56		

Table 18 displays the non-parametric evaluation of students' self-assessed competency levels grouped according to socio-economic status. The statistical test yielded an H -statistic of 22.268 with an asymptotic significance level of $p < .001$. Because the p -value is well below the standard threshold of .05, the null hypothesis is rejected. This indicates a statistically significant difference in self-assessed competency levels across the different family income brackets. Students from middle-income families (P21,191 – P43,828) exhibited the highest mean rank (86.50), whereas students in the lowest income bracket (below P21,190) demonstrated a lower mean rank (48.92). However, these results must be interpreted with caution due to the heavy concentration of respondents in the lowest income group (84.9%, $n=90$) and the extremely small sample sizes in the higher income brackets ($n=1$ each).

The findings are opposed by Bhat et al. (2016) who concluded that socio economic status is a significant factor in academic achievement. This is supported by the various studies of Davidovitch and Dorot (2023) who found that individuals with high socio-economic status will show higher motivation to succeed than individuals with moderate and low socio-economic status. They showed poor and unsatisfactory academic performance. However, Valentin et al. (2023) state that the academic resilience and self-efficacy have strong impact to academic success, regardless of Socio-economic status.

Research Question 5: Is there a significant difference between the students' self-assessed competency level (school-based readiness) and their performance evaluation as rated by industry supervisors?

Table 19. Wilcoxon Signed-Rank Test Comparing Student Self-Assessed Competency Levels and Industry Supervisor Ratings ($n = 106$ pairs)

Competency Levels and Industry Supervisor Ratings (n = 100 pairs)					
		N	Mean Rank	Z	Asymp. Sig. (2-tailed)
Supervisors-Evaluation – Self-Assessment	Negative Ranks	9a	5	-2.694b	.007
	Positive Ranks	0b	0		
	Ties	97c			
	Total	106			



As seen in Table 19, a Wilcoxon Signed-Rank test revealed a statistically significant difference between students' self-assessed competency levels ($M=4.05$) and the performance ratings evaluated by their industry supervisors ($M=3.72$), $Z=-2.694$, $p=.007$. Consequently, the null hypothesis of no significant difference is rejected. Out of 106 paired evaluations, 97 student-supervisor pairs yielded identical ratings (ties), while 9 students received supervisor ratings that were lower than their self-assessed competency scores (negative ranks). Notably, no student received a supervisor rating that exceeded their self-assessment (0 positive ranks). These results indicate that while supervisors' evaluations matched students' self-assessments in most cases, whenever a discrepancy existed, students tended to rate their technical readiness higher than their actual workplace performance as evaluated by industry professionals. These results directly align with the findings of Taboasares and Castillo (2024), who observed a similar perception gap where Senior High School work immersion students evaluated their overall performance more favorably than their external immediate supervisors.

Ethical Considerations

This study followed ethical standards in educational research to protect the rights and welfare of the participants. Permission to conduct the study was obtained from the Department of Education Division Office and the School Principal of Baliwasan Senior High School. Informed consent was obtained from all participants. For participants who were minors, parental consent was also secured after explaining the purpose of the study, the procedures involved, and their right to participate voluntarily or withdraw from the study at any time without any consequences. Confidentiality and anonymity were strictly observed. Participants' identities were protected through the use of codes, and no personal information was disclosed in the data analysis or report in accordance with the Data Privacy Act of 2012 (Republic Act No. 10173). All data collected were used solely for research purposes and stored securely. The study ensured that participants were not exposed to physical, psychological, or emotional harm. Survey questions were non-intrusive, and data collection was conducted during students' free time to avoid disruption and coercion. Ethical principles of fairness, objectivity, and academic integrity were upheld throughout the research process.

Conclusion

The study concluded that Senior High School students specializing in Computer Systems Servicing (CSS) demonstrated high levels of competency across the core technical skill areas, regardless of their sex, age, or socioeconomic status, indicating that these demographic factors did not significantly influence their competencies. Students performed best in installing and configuring computer systems and in setting up networks and servers, while maintenance and repair, although rated the lowest, still reflected a high level of proficiency and identified areas for further improvement. Industry supervisors also evaluated the students positively during their work immersion; however, a significant difference was found between the students' self-assessed competencies and their workplace performance, suggesting the need to strengthen the alignment between school-based training and industry expectations. These findings contribute to the improvement of the CSS curriculum, instructional practices, and work immersion programs by emphasizing the importance of providing authentic learning experiences that enhance students' technical competencies and workplace readiness. Future studies may explore additional factors influencing competency development and evaluate interventions designed to reduce the gap between perceived and actual workplace performance.

Recommendations

Based on the findings of the study, it is recommended that schools strengthen the implementation of the Computer Systems Servicing (CSS) program by adopting inclusive and flexible learning approaches, promoting greater participation of female students through career guidance and gender-inclusive initiatives, and providing financial assistance and accessible learning resources to support students from low-income families. Instruction should place greater emphasis on maintenance and repair competencies through hands-on laboratory activities, troubleshooting exercises, diagnostic tasks, and authentic repair experiences while reinforcing occupational health and safety standards and environmental practices such as the 5S and 4Rs. Schools should also enhance collaboration with industry partners by expanding work immersion opportunities, integrating industry-based simulations, practical competency assessments, mentorship programs, and regular employer feedback to better align school-based training with workplace expectations and improve students' employability. Furthermore, future researchers are encouraged to investigate other factors that may influence students' competency development and workplace performance, evaluate interventions aimed at reducing the gap between self-assessed and industry-assessed competencies, and

replicate the study across different institutions and technical-vocational specializations to enhance the generalizability of the findings.

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